Method of Test for
DETERMINATION OF pH VALUE OF WATER AND SOIL
DOTD Designation: TR 430-11

I. Scope

This method of test describes the procedure for determining the pH of water and soil samples.

II. Apparatus

A. **Container** – widemouth, nonmetallic, 2 oz or larger in size, glass beaker or leak proof cup.

B. **pH meter** – suitable for laboratory analysis with either one or two electrodes.
   1. Before use, inspect the electrodes to ensure that they contain a saturated solution of potassium chloride. Check manufacturer's operating manual if electrodes require the addition of potassium chloride.
   2. When the electrodes are not being used for standardization or testing, keep them immersed in distilled water. (See Note 1.)

Note 1: *Newer models of pH meters come equipped with a sleeve which is placed over the electrode during storage. If the electrode is supplied with a sleeve, a saturated solution of potassium chloride shall be placed in the sleeve. If the model is equipped with a sleeve the electrodes should not be placed in distilled water during storage.*

C. **Standard buffer solutions of known pH values** - use values of 5.0 and 7.0.

D. **Distilled water** – with a pH value between 6.5 and 7.0 that has been freshly prepared (or freshly boiled) and cooled to room temperature.

E. **Balance** – sensitive to 0.1 g.

F. **Thermometer**– (F or C corresponding to the temperature controller of the pH meter) having a maximum of 1º graduations which cover the range of temperature at which tests are to be conducted.

G. **Glass stirring rod**

H. **Graduated cylinder**

I. **Soft cloth**

J. **Wash bottle**

K. **Spoon or small scoop**

L. **pH Value of Water and Soils Worksheets**

M. **Soil/Soil Aggregate Worksheet**

III. Sample Preparation

A. No special preparation is necessary for water sample unless soil is present. If soil is present, allow water sample to settle, then decant.

B. Prepare soil sample in accordance with DOTD Designation: TR 411, Method A – Dry Preparation of Disturbed Samples.

IV. Standardization of pH Meter

A. Inspect electrodes per manufacturer's instructions prior to use.

B. Standardize the pH meter daily before determination of pH values or at any time an instrument malfunction is suspected.
   1. Use a standard buffer solution in the range of the pH of the

sample to be tested, if such information is known beforehand. Otherwise, begin with a standard solution having a pH of 7.0.

2. Pour 50 ± 5 cc of the solution into a clean beaker or cup.
3. Check the temperature of the solution and adjust the temperature controller of the pH meter accordingly.
4. Immerse the electrodes of the pH meter into the solution and gently swirl the container so as to obtain good contact between the solution and the electrodes.
5. Allow the electrodes to stand in the solution for 15 seconds before reading the pH value. (See Note 2.)
6. Read the pH value on the meter. If the value does not read the pH of the solution being used for standardization, adjust the pH meter to read this known pH (5.0 or 7.0).
7. Remove electrodes from the solution, rinse well with distilled water and wipe lightly with a soft cloth. Discard used buffer solution.

V. **Procedure**

A. Determination of pH Value of Water.

1. Stir the prepared water sample vigorously with a clean glass stirring rod.
2. Obtain a test specimen by pouring 50 ± 5 cc into a clean beaker or cup.
3. Check the temperature of the test specimen and adjust the temperature controller of the pH meter accordingly.
4. Immerse the electrodes of the pH meter into the test specimen and gently swirl the container so as to obtain good contact between the water and the electrodes.
5. Allow the electrodes to stand in the test specimen 15 seconds before reading the pH value. (See Note 2.)
6. Read the pH value. If the pH value is within ± 2.0 of the buffer solution used, record on the worksheet to the nearest 0.1 as pH value of sample. (See Figure 1.) If the pH value is not within ± 2.0, standardize the pH meter using the other buffer solution and rerun the test.
7. Remove electrodes from the test specimen, rinse well with distilled water. Wipe lightly with a soft cloth to remove any film formed on the electrodes.

B. Determination of pH Value of Soil.

1. Obtain a test specimen of soil, weighing 10.0 ± 0.1 g and place into a clean beaker or cup.
2. Add 50 ± 5 cc of distilled water to the test specimen.
3. Stir the test specimen solution vigorously to disperse soil uniformly in water.
4. Stir the test specimen solution at approximately 15 minute intervals for a period of one hour in order to disperse the soil and make sure all soluble material is in solution.
5. Record the beginning time and the time of each stirring on the worksheet.
6. Check the temperature of the test specimen solution and adjust the temperature controller of the pH meter accordingly.
7. Immediately before immersing electrodes into the test specimen solution, stir the solution then remove the glass stirring rod.

8. Immerse electrodes into the solution and gently swirl the container so as to obtain good contact between the solution and the electrodes.
9. Allow the electrodes to stand in the test specimen solution for 15 seconds before reading the pH value. (See Note 2).
10. Read the pH value. If the pH value is within ± 2.0 of the buffer solution used, record on the worksheet to the nearest 0.1 as pH value of sample. (See Figure 2.) If the pH value is not within ± 2.0, restandardize the pH meter using the other buffer solution and rerun the test.
11. Remove electrodes from the test specimen solution, rinse well with distilled water. Wipe lightly with a soft cloth to remove any film formed on the electrodes

Note 2: *If the pH reading appears unstable when the electrodes are immersed in the buffer solution or test specimen, leave the electrodes immersed until the pH reading has stabilized. In some cases, the waiting period for the stabilization of the pH reading may take 5 minutes or more.*

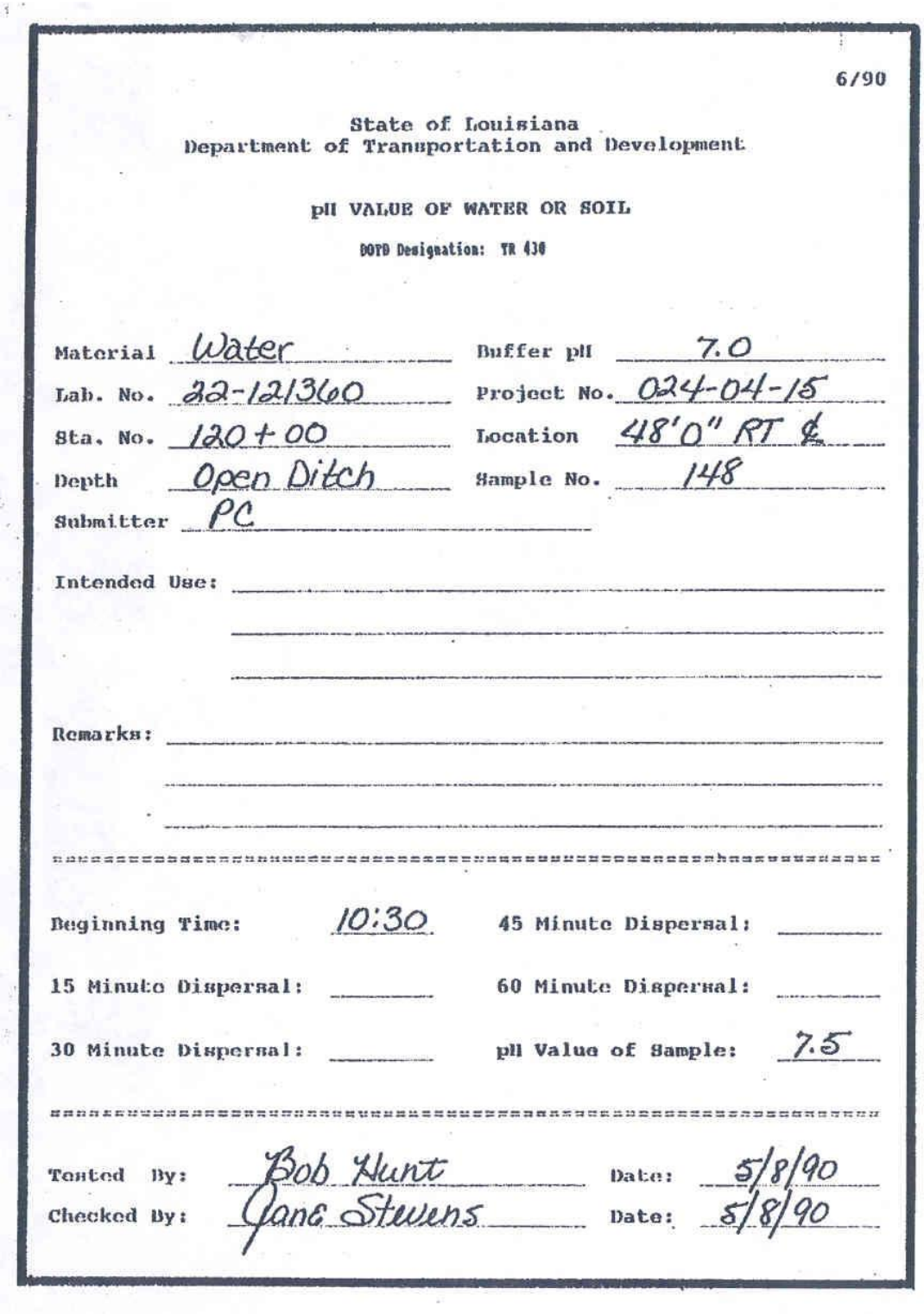
VI. **Report**

A. For water samples, the test information reported on the worksheet shall be the beginning time of test and the pH value recorded to the nearest tenth (0.1).

B. For soil samples, the test information reported shall include the beginning time of test, the time of each dispersal and the pH value recorded to the nearest tenth (0.1). The pH value for individual samples shall also be reported on the Aggregate Test Report form. (See Figure 3)

VII. **Normal Test Reporting Time**

Normal test reporting time is 24 hours.



6/90

State of Louisiana
Department of Transportation and Development

pH VALUE OF WATER OR SOIL

DOTD Designation: TR 430

Material Water
Buffer pH 7.0
Lab. No. 22-121360
Project No. 024-04-15
Sta. No. 120+00
Location 48'0" RT ℄
Depth Open Ditch
Sample No. 148
Submitter PC

Intended Use:

Remarks:

Beginning Time: 10:30
45 Minute Dispersal:
15 Minute Dispersal:
60 Minute Dispersal:
30 Minute Dispersal:
pH Value of Sample: 7.5

Tested By: Bob Hunt
Date: 5/8/90
Checked By: Jane Stevens
Date: 5/8/90

Figure 1

6/90

State of Louisiana
Department of Transportation and Development

pH VALUE OF WATER OR SOIL

DOTD Designation: TR 430

Material Soil | Buffer pH 7.0
Lab. No. 22-1302165 | Project No. 024-04-15
Sta. No. 482 + 50 | Location 22'-0" LT ℄
Depth 2'-7" | Sample No. 230
Submitter SD

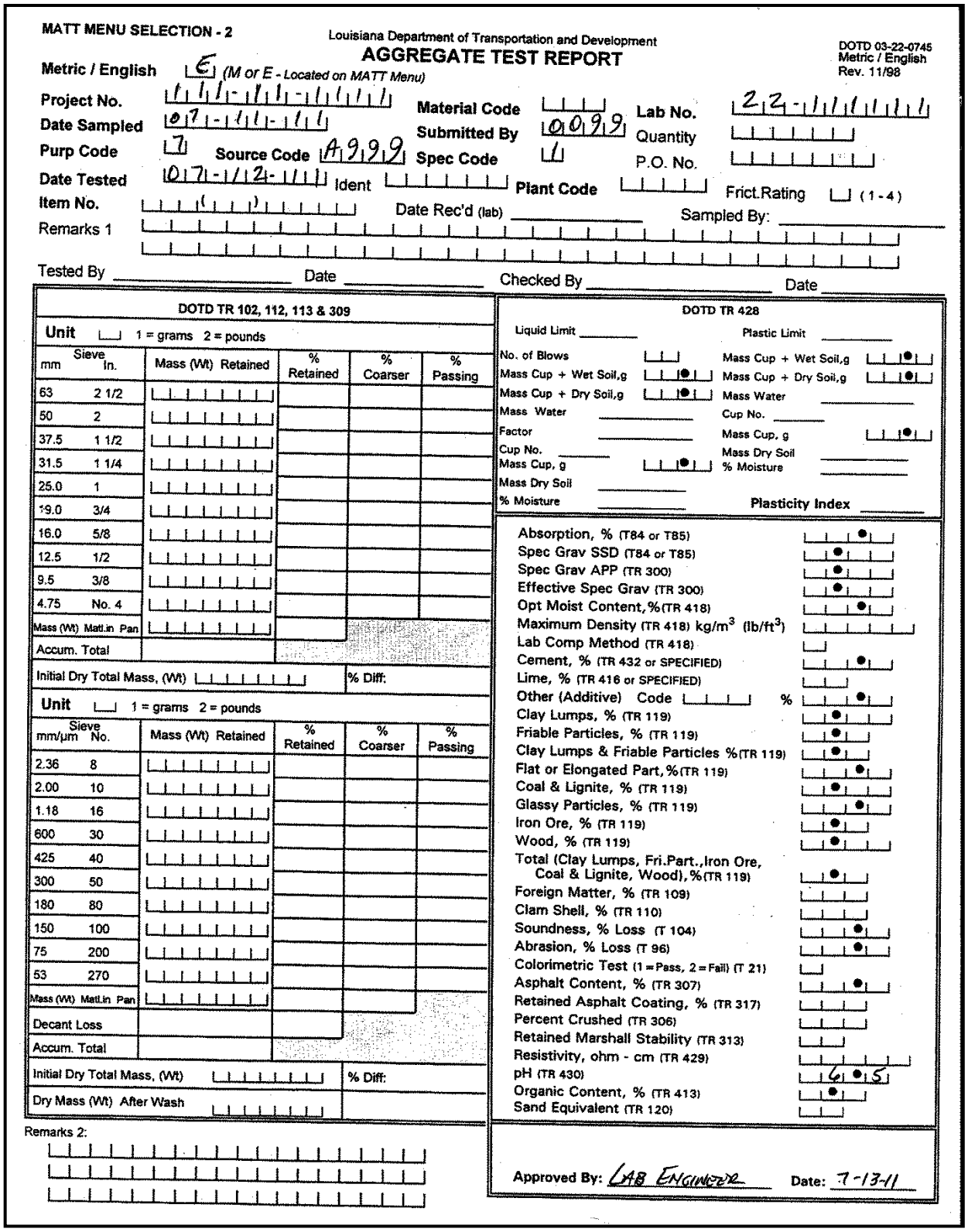
Intended Use:

Remarks:

Beginning Time: 9 A.M. | 45 Minute Dispersal: 9:45
15 Minute Dispersal: 9:16 | 60 Minute Dispersal: 10 A.M.
30 Minute Dispersal: 9:35 | pH Value of Sample: 6.5

Tested By: Bob Hunt | Date: 5/8/90
Checked By: Jane Stevens | Date: 5/8/90

Figure 2



MATT MENU SELECTION - 2

Louisiana Department of Transportation and Development

AGGREGATE TEST REPORT

DOTD 03-22-0745
Metric / English
Rev. 11/98

Metric / English E (M or E - Located on MATT Menu)

Project No. 111-111-111111
Material Code
Lab No. 22-111111
Date Sampled 07-11-111
Submitted By 00999
Quantity
Purp Code 7
Source Code A9999
Spec Code 1
P.O. No.
Date Tested 07-12-1111
Ident
Plant Code
Frict.Rating (1-4)
Item No. 1(1)
Date Rec'd (lab)
Sampled By:
Remarks 1

Tested By ____ Date ____ Checked By ____ Date ____

DOTD TR 102, 112, 113 & 309

Unit 1 = grams 2 = pounds

Sieve mm	Sieve In.	Mass (Wt) Retained	% Retained	% Coarser	% Passing
63	2 1/2				
50	2				
37.5	1 1/2				
31.5	1 1/4				
25.0	1				
19.0	3/4				
16.0	5/8				
12.5	1/2				
9.5	3/8				
4.75	No. 4				
Mass (Wt) Matl.in Pan					
Accum. Total					

Initial Dry Total Mass, (Wt) ____ % Diff:

Unit 1 = grams 2 = pounds

Sieve mm/µm	Sieve No.	Mass (Wt) Retained	% Retained	% Coarser	% Passing
2.36	8				
2.00	10				
1.18	16				
600	30				
425	40				
300	50				
180	80				
150	100				
75	200				
53	270				
Mass (Wt) Matl.in Pan					
Decant Loss					
Accum. Total					

Initial Dry Total Mass, (Wt) ____ % Diff:

Dry Mass (Wt) After Wash ____

Remarks 2:

DOTD TR 428

Liquid Limit ____ Plastic Limit ____

No. of Blows		Mass Cup + Wet Soil,g	
Mass Cup + Wet Soil,g		Mass Cup + Dry Soil,g	
Mass Cup + Dry Soil,g		Mass Water	
Mass Water		Cup No.	
Factor		Mass Cup, g	
Cup No.		Mass Dry Soil	
Mass Cup, g		% Moisture	
Mass Dry Soil			
% Moisture			

Plasticity Index ____

Absorption, % (T84 or T85)	
Spec Grav SSD (T84 or T85)	
Spec Grav APP (TR 300)	
Effective Spec Grav (TR 300)	
Opt Moist Content, % (TR 418)	
Maximum Density (TR 418) kg/m³ (lb/ft³)	
Lab Comp Method (TR 418)	
Cement, % (TR 432 or SPECIFIED)	
Lime, % (TR 416 or SPECIFIED)	
Other (Additive) Code %	
Clay Lumps, % (TR 119)	
Friable Particles, % (TR 119)	
Clay Lumps & Friable Particles % (TR 119)	
Flat or Elongated Part, % (TR 119)	
Coal & Lignite, % (TR 119)	
Glassy Particles, % (TR 119)	
Iron Ore, % (TR 119)	
Wood, % (TR 119)	
Total (Clay Lumps, Fri.Part., Iron Ore, Coal & Lignite, Wood), % (TR 119)	
Foreign Matter, % (TR 109)	
Clam Shell, % (TR 110)	
Soundness, % Loss (T 104)	
Abrasion, % Loss (T 96)	
Colorimetric Test (1 = Pass, 2 = Fail) (T 21)	
Asphalt Content, % (TR 307)	
Retained Asphalt Coating, % (TR 317)	
Percent Crushed (TR 306)	
Retained Marshall Stability (TR 313)	
Resistivity, ohm - cm (TR 429)	
pH (TR 430)	6.5
Organic Content, % (TR 413)	
Sand Equivalent (TR 120)	

Approved By: LAB ENGINEER Date: 7-13-11

Figure 3
Aggregate Test Report (03-22-0745)